

I have much pleasure in dedicating this beautiful species to my friend Mr. Herbert Druce. That gentleman kindly reminded me of the fact that Walker had described a species of this group from Mr. Saunders's collection. Upon looking up the description of Walker's *M. cyaneifera* from Batchian and Ceram, hitherto undetermined by me, I find that it answers admirably to Cramer's species *M. glauca*. It is extremely probable that Walker would describe the latter species in his Supplement, since in his Catalogue he identified *M. lativitta* and *M. zonea* of Moore as opposite sexes of Cramer's species, and spoke of the typical *M. glauca* as var. β , suggesting that it might be a distinct species.

Milionia Snelleni, sp. n.

♀. Less brilliant in colour than the preceding; primaries with the subbasal spot larger, more diffused, and bright ultramarine blue, the belt across the wings much further from the base, arched, wider, cadmium-yellow, sprinkled at its inferior extremity with vermilion scales; secondaries with the belt much wider, much nearer to the outer margin, its inner edge widely waved or subsigmoidal, colour vermilion; basal area below narrowly streaked with bright blue. Expanse of wings 70 millim.

Celebes.

This is not at all likely to be the female of *M. Drucei*, since the species of this genus are unquestionably alike in the sexes, whereas these two differ far more than some of the known species. *M. Drucei*, in the banding of the primaries, approaches *M. requina*, Quoy (= *M. optima*, Walker, = *M. flammata*, Vollenh.), whereas *M. Snelleni* has a band more nearly resembling that of *M. glauca*, though broader and more arched. I have named this species after Herr Snellen, the author of a long paper on the Lepidoptera of Celebes in the 'Tijdschrift voor Entomologie,' 1878-81.

XIV.—On *Rudimentary Wings in the Coleoptera*.

By Dr. H. DEWITZ*.

THE hind wings of the Coleoptera show us most distinctly how an organ may gradually become aborted by disuse, and how a transformation of the whole habit of the animal may

* Translated by W. S. Dallas, F.L.S., from the 'Zoologischer Anzeiger,' no. 141, June 18, 1883, p. 315.

be connected with this. The membranous hind wings of beetles, which serve for flight, lie, as is well known, concealed beneath the firm horny fore wings, the so-called elytra. For the purpose of flight the elytra are raised and the folded hind wings extended, so as often to exceed the former in length. But many beetles do not fly at all. In these we find the hind wings more or less aborted or entirely deficient. This phenomenon occurs with especial frequency among the Carabidæ, Melasomata, and Curculionidæ, and also, although less frequently, among the Ptinidæ.

Thus, for example, while in *Melolontha vulgaris*, Fab., the length of the body without the antennæ amounts to 0·03, that of the fore wing to 0·02, and that of the hind wing to 0·03 metre, these measurements in *Pterostichus vulgaris*, Linn., are as 0·017 : 0·01 : 0·004, and in *Niptus hololeucus*, Cam., as 0·004 : 0·0025 : 0·000. The last two species do not fly at all, as the hind wings are either so small that they cannot support the body or entirely wanting.

As the wings are already indicated in the larva, I was inclined to think that, in one or other of the species entirely destitute of wings, traces of these organs would occur, at least in the larval or the pupal stage. For four years my labours were in vain, and it is only quite recently that I succeeded in demonstrating the rudimentary hind wings in the larvæ and pupæ of *Niptus hololeucus*, Cam., in which both sexes are apterous, *i. e.* destitute of hind wings.

This pretty little beetle has come to us from Asia Minor, and occurs frequently in Berlin in houses from July to September. It likes to conceal itself among linen and woollen stuffs. M. Kläger, who was kind enough to furnish me with material, found the perfect beetle every year in a linen-press among the accumulated linen. M. Wachtler, a merchant here, to whom I am also indebted for a great number of the animals, found them in bales of stuffs. He thinks that they seek these hiding-places, not to lay their eggs there, but to protect themselves from the cold; he did not observe even the smallest quantity of frass upon the stuffs.

After several unsuccessful attempts, I succeeded in rearing the beetles in bran. For this purpose I placed the animals, in the autumn, in a vessel filled with bran. Here they deposited their eggs; and at the end of March the larvæ were full-grown. They are 0·006 metre long, white with a few scattered brown hairs, and have the form of the grub of the cockchafer.

The rudiments of the fore wings appear in the half-grown larva, on the two sides of the mesothorax, as crescentiform

thickenings of the hypodermis ; in the full-grown larva the wing appears as a crescentiform lobe standing free from the hypodermis and between that and the chitinous membrane. The wing-rudiments grow directly outwards, and do not lie, as in the *Lepidoptera* and *Phryganeidæ*, in sac-like diverticula. As these wing-lobes are placed under the chitinous membrane until the passage to the pupa state, it follows that, after the appearance of the wing during the larval existence, no ecdysis takes place. Of the hind wings no trace is to be seen ; the hypodermis on the sides of the third thoracic segment is just as thin as on the other parts of the body. It is only when the animal spins up* that a semicircular thickening of the hypodermis is formed on each side of the third thoracic segment. As always in the formation of the imaginal disks, a tracheal and a nervous branchlet run to the spot, and probably furnish the incitement to the multiplication and accumulation of the hypodermal cells. Some time after the spinning-up we find the fore wing as a long flat lobe lying beneath the old chitinous membrane of the larva, and reaching down nearly to the legs. It is widened in its basal part, and pointed at the opposite end. At this time a halfmoon-shaped flat lobe has grown out of the thickening on the sides of the third thoracic segment, agreeing exactly in structure and form with the earlier formed halfmoon-shaped fore wing of the full-grown larva.

The old chitinous skin of the larva is thrown off ; and the wings, like the other members, come freely into view after a new chitinous membrane has been secreted over them as over the whole body.

In the pupa the fore wing is of considerable length, while the hind wing lies on the side of the third thoracic segment in the form of a very minute freely projecting scale. In the fully developed beetle I could detect no trace of the hind wing ; and should any thing of the kind be discoverable, it will be at the utmost a minute chitinous wart, for the production of which an imaginal disk with tracheæ and nerves can never have been necessary.

While the fore wing, therefore, already occurs in the half-grown larva, the rudiment of the hind wing only shows itself much later, when the animal is already on the point of terminating the larval stage. That these rudiments of hind wings, occurring only in the last larval stage of all and in the pupal

* For this purpose a thread is drawn out of a gland situated in the neighbourhood of the anus, and with this the animal fastens together small particles of bran.

stage, have no purpose to serve is perfectly clear. We have therefore to do with an organ which either will at some time arrive at full development and function, and is consequently advancing, or which was at an early period well developed and in use as an organ of flight, and has consequently retrograded.

That it is not an advancing organ, but one in course of disappearance, is shown most decidedly by the circumstance that this, like all retrogressive organs, does not, like those in full function, increase with the development of the individual, but, on the contrary, diminishes.

We are therefore justified in assuming that *Niptus hololeucus* once bore well-developed hind wings, and that these gradually became aborted in consequence of disuse, until they were finally thrown back into the young stages, and some day will disappear even from these stages. In other wingless beetles this period may have already occurred.

While in other cases the hind wings make their appearance nearly at the same time as the fore wings, we have seen that the aborted hind wings in *Niptus* originate much later than the equivalent organs which attain development, namely the fore wings. This circumstance seems to show that rudimentary organs are not only thrown back to the younger stages, but that, in many cases also, the period of their appearance is much later than with the equivalent well-developed organs. They are consequently, if I may so express myself, straitened on two sides. I do not know whether other rudimentary organs, such, for example, as the upper incisors of the Ruminants, which never break through, make their appearance much later than the well-developed lower ones.

This abortion of an organ brings after it other transformations of the body. Without the hind wings the beetles cannot fly. It is therefore not necessary for them to be able to spread out the elytra, the latter rather remain permanently lying upon the back. What is the consequence? The two elytra grow together to form a firm dorsal shield, such as we find in nearly all beetles which are entirely destitute of hind wings. At the same time the elytra become convex and bend round at the sides, so that they embrace the abdomen. In consequence of the disappearance of the wing-muscles, the thorax becomes altered. The body acquires quite a different form; new forms are produced which we call species.